

- [17] Hang R Q, Liu S, Liu Y L, et al. Preparation, characterization, corrosion behavior and cytocompatibility of NiTiO₃ nanosheets hydrothermally synthesized on biomedical NiTi alloy[J]. *Materials Science and Engineering C*, 2019, 97: 715 – 722.
- [18] Yuan W, He X, Zhou X S, et al. Hydroxyapatite nanoparticle-coated 3D-printed porous Ti6Al4V and CoCrMo alloy scaffolds and their biocompatibility to human osteoblasts [J]. *Journal of Nanoscience and Nanotechnology*, 2018, 18 (6): 4360 – 4365
- [19] Chen M H, Huang L, Shen X K, et al. Construction of multilayered molecular reservoirs on a titanium alloy implant for combinational drug delivery to promote osseointegration in osteoporotic conditions [J]. *Acta Biomaterialia*, 2020, 105: 304 – 318.
- [20] Ding Y, Yuan Z, Liu P, et al. Fabrication of strontium-incorporated protein supramolecular nanofilm on titanium substrates for promoting osteogenesis[J]. *Materials Science and Engineering C*, 2020, 111: 110851.
- [21] Zorn G, Gotman I, Gutmanas E Y, et al. Surface modification of Ti45Nb alloy by immobilization of RGD peptide via self assembled monolayer[J]. *Journal of Materials Science: Materials in Medicine*, 2007, 18(7): 1309 – 1315.
- [22] Guarise C, Maglio M, Sartori M, et al. Titanium implant coating based on dopamine-functionalized sulphated hyaluronic acid: in vivo assessment of biocompatibility and antibacterial efficacy[J]. *Materials Science and Engineering C*, 2021, 128: 112286.
- [23] Zhu Y, Liu D D, Wang X L, et al. Polydopamine-mediated covalent functionalization of collagen on a titanium alloy to promote biocompatibility with soft tissues [J]. *Journal of Materials Chemistry B*, 2019, 7(12): 2019 – 2031.
- [24] Yang Y, Lai Y K, Zhang Q Q, et al. A novel electrochemical strategy for improving blood compatibility of titanium-based biomaterials [J]. *Colloids and Surfaces B: Biointerfaces*, 2010, 79(1): 309 – 313.
- [25] Jiang J Y, Xu J L, Liu Z H, et al. Preparation, corrosion resistance and hemocompatibility of the superhydrophobic TiO₂ coatings on biomedical Ti-6Al-4V alloys[J]. *Applied Surface Science*, 2015, 347: 591 – 595.
- [26] Song J, Liao Z H, Shi H Y, et al. Blood compatibility of ZrO₂ particle reinforced PEEK coatings on Ti6Al4V substrates[J]. *Polymers*, 2017, 9(11): 589.
- [27] Chen J, Xu J L, Huang J, et al. Formation mechanism and hemocompatibility of the superhydrophobic surface on biomedical Ti-6Al-4V alloy[J]. *Journal of Materials Science*, 2021, 56(12): 7698 – 7709.
- [28] Wang G Q, Wang S R, Yang X F, et al. Fretting wear and mechanical properties of surface-nanostructural titanium alloy bone plate [J]. *Surface and Coatings Technology*, 2021, 405: 126512.
- [29] Wu X F, Liu S Y, Chen K, et al. 3D printed chitosan-gelatin hydrogel coating on titanium alloy surface as biological fixation interface of artificial joint prosthesis [J]. *International Journal of Biological Macromolecules*, 2021, 182: 669 – 679.

行业动态

Amaero 公司将新建钛合金粉末制造工厂

2021年7月5日，澳大利亚增材制造公司 Amaero International Limited(以下简称 Amaero 公司)宣布计划投资 800 万美元在维多利亚州新建一座气雾化钛及钛合金粉末制造工厂，并预计将在 18 个月内完成工厂建设及设备安装调试。该工厂将通过气雾化法将钛合金棒材转化为适用于航空领域 3D 打印用的钛合金粉末。

钛金属产业的纵向一体化程度高，为提升产品附加值，生产海绵钛的国家一般会纵向发展钛铸锭及钛加工材产业。传统钛产业的各个生产环节都伴随有低成本、高能耗等问题，而增材制造技术具有加工精度高、周期短等优势，被越来越广泛地应用于钛金属制造领域。然而，由于严格的安全性要求以及钛粉较低的产量，一定程度上限制了 3D 打印钛金属零部件在航空航天领域的应用。

目前，钛已被列入美国、欧洲、澳大利亚、日本、加拿大等国家和地区的关键原材料清单，因此建立安全的钛金属产品供应链受到了世界各国的关注。虽然 Amaero 等公司开发的新型钛产品生产技术可在可扩展性、材料性能及后处理加工等方面有待提升，但依然有望替代传统钛产品的生产工艺。

何蕾编译自 Roskill 网站